A

Glossary

Accident: An unwanted transfer of energy or an environmental condition which, due to the absence or failure of barriers or controls, produces injury to persons, damage to property, or reduction in process output.

Accident Investigation: The systematic appraisal of unwanted events for the purpose of determining causal factors, subsequent corrective actions, and preventive measures.

Accident Investigator: An individual who has completed training in DOE accident investigation techniques.

Accident or Emergency Response Team: A team or teams of emergency and accident response personnel for a particular site. This team may be composed of a number of teams from the site, such as local police and firefighter units, emergency medical personnel, and hazardous material teams.

Analysis: The use of methods and techniques for arranging data to: (a) assist in determining what additional data are required; (b) establish consistency, validity, and logic; (c) establish necessary and sufficient events for causes; and (d) guide and support inferences and judgments.[1]

Analytical Tree: Graphical representation of an accident in a deductive approach (general to specific). The structure resembles a tree—that is, narrow at the top with a single event (accident) and then branching out as the tree is developed, and identifying root causes at the bottom branches.

Appointing Official: A designated authority responsible for assigning accident investigation boards for Type A and Type B investigations, monitoring the accident investigation process, and closing the investigation when the actions in DOE Order 225.1, 4.c are completed.

Barrier: Anything used to control, prevent, or impede energy flows. Common types of barriers include equipment, administrative procedures and processes, supervision/ management, warning devices, knowledge and skills, and physical objects. Barriers may be control or safety barriers or act as both.

Barrier Analysis: An analytical technique used to identify energy sources and the failed or deficient barriers and controls that contributed to an accident.

Board Chairperson: The leader who manages the accident investigation process, represents DOE in all matters regarding the accident investigation, and reports to the appointing official for purposes of the accident investigation.

Board Members: A group of three to six DOE staff assigned to investigate an accident. This group reports to the board chairperson during the accident investigation.

Causal Factors: All events or conditions in the accident sequence necessary and sufficient to produce or contribute to the unwanted result. Some types of causal factors are:

[1]Ferry, Ted S., *Modern Accident Investigation and Analysis*, 2nd Edition, John Wiley & Sons, New York, New York, 1988.

- Direct cause: The immediate events or conditions that caused the accident.
- Contributing causes: Events or conditions which increase the likelihood of an accident but which individually did not cause the accident.
- Root causes: Conditions or events which if eliminated or modified, will prevent recurrence of an accident or similar accidents.

Cause: Anything which contributes to an accident or incident. In an investigation, the use of the word "cause" as a singular term should be avoided. It is preferable to use a multiple term such as "causal factors," rather than identifying "*the cause*."

Chain of Custody: The process of documenting, controlling, securing, and accounting for physical possession of evidence from initial collection through final disposition.

Change: Stress on a system that was previously in a state of equilibrium, or anything that disturbs the planned or normal functioning of a system.

Change Analysis: An analytical technique used for accident investigations, wherein accident-free reference bases are established, and then changes relative to accident causes and situations are systematically identified. In change analysis, all changes are considered, including those initially considered trivial or obscure.

Conclusions: Significant deductions derived from analytical results. Conclusions are derived from and must be supported by the facts plus the results of testing and analyses conducted. Conclusions are statements that answer two questions the accident investigation addresses: what happened and why did it happen? Conclusions include concise recapitulations of the causal factors (direct, contributing, and root causes) of the accident determined by analysis of facts.

Controls: Those barriers that control wanted energy flows, such as the insulation on an electrical cord, a stop sign, a procedure, or a safe work permit.

DOE Operations: Activities funded by DOE for which DOE has authority to enforce environmental protection, safety, and health protection requirements.

DOE Site: A tract either owned by DOE, leased, or otherwise made available to the Federal government under terms that afford DOE rights of access and control substantially equal to those it would possess if it held the fee (or pertinent interest therein) as agent of and on behalf of the government. One or more DOE operations/program activities carried out within the boundaries of the described tract.

Field Element: A general term for any officially established Departmental component (excluding individual duty stations) located outside the Washington, D.C., metropolitan area.

Energy: The capacity to do work and overcome resistance. Energy exists in many forms, including acoustic, potential, electrical, kinetic, thermal, biological, chemical, and radiation (both ionizing and non-ionizing).

Energy Flow: The transfer of energy from its source to some other point. There are two types of energy flows: wanted (controlled—able to do work) and unwanted (uncontrolled—able to do harm).

Event: An occurrence. Something significant and real-time that happens. An accident involves a sequence of events occurring in the course of work activity and culminating in unintentional injury or damage.

Events and Causal Factors Chart: Graphical depiction of a logical series of events and related conditions that precede the accident.

Hazard: The potential for energy flow(s) to result in an accident or otherwise adverse consequence.

Human Factors: The study of human interactions with products, equipment, facilities, procedures, and environments used in work and everyday living. The emphasis is on human beings and how the design of equipment influences people.

Investigation: A detailed, systematic search to uncover the "who, what, when, where, why, and how" of an occurrence and to determine what corrective actions are needed to prevent a recurrence.

Investigation Report: A clear and concise written account of the investigation results.

Judgments of Need: Managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recurrence of an accident.

Occurrence: An event or condition that adversely affects, or may adversely affect, DOE or contractor personnel, the public, property, the environment, or DOE mission.

Occurrence Reporting and Processing System (ORPS): The reporting system established and maintained for reporting occurrences related to the operation of DOE facilities.

Point of Contact: A DOE staff member who is assigned the role of liaison with the Accident Investigation Program Manager in the Office of Security Evaluations (EH-21), who administers the accident investigation program. In this role, the point of contact ensures that site readiness teams are trained in collecting and maintaining initial accident investigation evidence and that their activities are coordinated with accident response teams.

Readiness Team: Trained personnel at each site that are available to perform initial response activities immediately following an accident and to begin the investigation process as quickly as possible. They are responsible for initiating the accident investigation, maintaining the integrity of evidence before the accident investigation board arrives, and supporting the board after its arrival.

Requirements Verification Analysis: A validation technique that determines whether the logical flow of data from analysis to conclusions and judgments of need is based on facts. This technique is conducted after all analyses are completed.

Root Cause Analysis: Any methodology that identifies the causal factors that, if corrected, would prevent recurrence of the accident.

Target: An object, person, or animal upon which an unwanted energy flow may act to cause damage, injury, or death.

B

References

a. DOE Order 225.1, Chg 2, *Accident Investigations,* April 28, 1996.

b. *Implementation Guide for Use with DOE Order 225.1 (DOE-G-225.1-1),* May 30, 1996.

c. DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information,* September 25, 1995.

d. DOE Order 360.1, *Training,* May 31, 1995.

e. *General Technical Qualification Standard,* Section 5.1, August 26, 1994.

f. *Department-Wide Area Qualification Standard-Occupational Safety Qualification Standard Competencies,* Section 1.4, May 1995.

g. Ferry, Ted S., *Modern Accident Investigation and Analysis*, 2nd Edition, John Wiley & Sons, New York, New York, 1988.

C

Specific Administrative Needs

Roles and Responsibilities of The Administrative Coordinator

The onsite administrative coordinator assists the board chairperson and board members in the day-to-day activities of the accident investigation. This includes serving as a central point of contact for the board, making arrangements for office facilities and equipment, managing report production, and maintaining investigation records.

Generally, the administrative coordinator (working closely with the board chairperson) is responsible for:

- Arranging for appropriate onsite office/work space and furnishings (including a large conference room that can be locked when not in use by the board, several small, hard-walled offices for conducting interviews, a central area to locate a library of documents collected, and several lockable file cabinets)
- Arranging for local court reporter(s)
- Arranging for security badges/passes for board members and property permits for personal equipment (cameras, computers, etc.)
- Arranging for specific security, access, safety, and health training, as required
- Arranging for telephone service and dedicated fax machine
- Arranging for a dedicated, high-speed copy machine that has collating and stapling capability
- Selecting a hotel and reserving a block of rooms
- Obtaining office supplies and consumables for use by board members and support staff
- Arranging for after-hours access to the site and work space
- Serving as the custodian for all keys provided by the site
- Determining site/field office contact for administrative and logistical support
- Preparing and maintaining interview schedules (if requested by board chairperson)
- Creating and maintaining onsite accident investigation files
- Maintaining chain of custody for evidence (if requested by board chairperson)
- Attending daily board meetings and taking notes to assist the chairperson
- Tracking action items and followup activities to completion
- Coordinating report preparation and production activities on site and at Headquarters
- Arranging for shipment of files and records to Headquarters for archiving at the end of the investigation.

D

Safety Management Template

Principle #1 - Line managers are responsible and accountable for safety.
Criterion 1-1: Clear Safety Policies and Goals
Line management implements effective safety policy and goals that reflect Departmental policies and industry standards and assures a safety culture that permeates every level of the organization.
Criterion 1-2: Defined Responsibilities and Authorities
Line managers are responsible and accountable for ensuring that DOE facility operations and work practices are performed in a manner that provides adequate protection to worker safety and health, the public, and the environment. Accordingly, line managers must ensure that: ▪ A clear division of responsibilities is established and communicated. ▪ Line managers have the authority to make and implement decisions regarding ES&H that are commensurate with their responsibilities. ▪ There are clear mechanisms throughout the line organizations for adjudicating disputes among line managers where discrepancies are believed to exist between work goals and ES&H management needs.
Criterion 1-3: Project and Resource Management Systems
Decision makers at appropriate levels of the organization must be capable of understanding and synthesizing program goals and ES&H risks in order to effectively deploy resources adequate to address both. Line managers must manage safety and its attainment by establishing management information systems to ensure that: ▪ Hazards are analyzed and understood. ▪ Appropriate hazard mitigation actions are identified and are in place.
Criterion 1-4: Line Management Accountability for Performance
Line managers are accountable for ES&H performance. Performance should be explicitly tracked and measured, and inadequate performance should have visible and meaningful consequences. Line managers must execute actions to attain and continuously improve the safety of their operations by ensuring that: ▪ Safety-related matters are reviewed, monitored, and audited on a regular basis. ▪ Findings resulting from these reviews, monitoring activities, and audits are resolved in a timely manner.

Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.
Criterion 2-1: Requirements Management
Processes must be in place to ensure that requirements are identified, transmitted, and implemented, and that they provide adequate protection to worker safety and health, the public, and the environment.
Criterion 2-2: Hazards Analysis
Hazards generally change as a facility cycles through the phases of design, construction, operation and maintenance, decommissioning and decontamination, and environmental restoration. It is thus important to continually analyze and assess hazards in order to identify the relative significance and application of Department requirements. To effectively mitigate hazards, line managers must ensure that: ▪ Requirements are established that are commensurate with hazards throughout the life cycle of the facility. ▪ Internal requirements are based on hazards analyses and, when implemented, are sufficient to ensure safety. ▪ Site-specific implementation plans and associated operating procedures define standards that will be used to comply with applicable safety requirements. ▪ The site is in compliance with applicable Federal and state statutes and Departmental policy and requirements.
Criterion 2-3: Implementation of Requirements
Line managers are responsible for ensuring that programs are implemented in compliance with defined requirements.
Criterion 2-4: Assessment Programs
Line management must establish and implement effective methodologies to monitor, review, and evaluate adherence to all applicable Departmental requirements and industry standards for safety and to achieve timely correction where warranted.

Principle #3 - Competence is commensurate with responsibilities.

Criterion 3-1: Staffing and Qualifications

The organization supports effective safety management by assuring appropriate levels of staffing and competence at every level. The organization has in place the means to:

- Determine the appropriate levels of staffing, experience, and training for each function, including consideration of responsibilities, activities, hazards, and schedules.
- Assure that subcontractors employed on site are adequately trained and qualified on job tasks, hazards, and DOE and contractor safety policies and requirements.
- Clearly identify vertical and horizontal lines of interface, communication, and support.
- Provide managers and supervisors with sufficient authority, staffing, and support to implement assigned responsibilities, analyses, and decisions.
- Develop and implement strategies for recruitment and retention of competent personnel.

Criterion 3-2: Technical Competence and Knowledge of Hazards

Workers and managers are technically competent to perform their jobs and are appropriately educated and knowledgeable of the hazards associated with site operations. Line managers must ensure that:

- Workers have the technical capability to recognize and respond appropriately to workplace hazards.
- Management, technical staff, and workers have the necessary levels of education, training, and experience.

Criterion 3-3: Worker Participation and Empowerment

Line managers recognize that active participation by workers is essential in maintaining and improving protection to worker safety and health, the public, and the environment. Therefore, line managers must ensure that:

- Workers and managers are empowered to take appropriate action in the face of hazards encountered during normal and emergency conditions, including the right to refuse unsafe work assignments.
- Processes for raising safety issues are established.
- Incentives are in place to promote a safety-conscious culture and worker participation and involvement in safety management.

Criterion 3-4: Training Programs

Line managers must establish and implement processes to ensure that training programs effectively measure and improve performance, and identify additional training needs.